

World Magnetic Model 2010

[spatialRepresentationInfo](#)
[referenceSystemInfo](#)
[identificationInfo](#)
[contentInfo](#)
[distributionInfo](#)
[dataQualityInfo](#)
[metadataMaintenance](#)

(MI_Metadata)

fileIdentifier: gov.noaa.ngdc:WMM2010

language: eng; USA

characterSet: (MD_CharacterSetCode) utf8

hierarchyLevel: (MD_ScopeCode) dataset

hierarchyLevelName: Magnetic Grid

contact: *xlink:* <https://www.ngdc.noaa.gov/docucomp/component/7df204c0-eb7c-47de-af08-9d2afb5c15a0> *title:* Brian Meyer

dateStamp: 2012-09-05

metadataStandardName: ISO 19115-2 Geographic Information - Metadata - Part 2: Extensions for Imagery and Gridded Data

metadataStandardVersion: ISO 19115-2:2009(E)

[return to top](#)

spatialRepresentationInfo: (MD_GridSpatialRepresentation)

numberOfDimensions: 2

cellGeometry: (MD_CellGeometryCode) point

transformationParameterAvailability: true

[return to top](#)

referenceSystemInfo: *xlink:* <https://www.ngdc.noaa.gov/docucomp/2504d000-8345-11e1-b0c4-0800200c9a66> *title:* WGS 84

[return to top](#)

identificationInfo: (MD_DataIdentification)

citation: (CI_Citation)

title: World Magnetic Model 2010

date: (CI_Date)

date: 2009-12-01

dateType: (CI_DateTypeCode) publication

edition: 3

editionDate: 2012-04-26

citedResponsibleParty: *xlink:* <https://www.ngdc.noaa.gov/docucomp/component/75ff8b8b-8a08-49b9-a469-e3f35bdf6164> *title:* Stefan Maus

citedResponsibleParty: (CI_ResponsibleParty)

organisationName: DOC/NOAA/NESDIS/NGDC > National Geophysical Data Center, NESDIS, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)

onlineResource: (CI_OnlineResource)

linkage: <http://ngdc.noaa.gov/geomag/WMM/DoDWMM.shtml>

role: (CI_RoleCode) distributor

presentationForm: (CI_PresentationFormCode) mapDigital

abstract: The World Magnetic Model is the standard model used by the U.S. Department of Defense, the U.K. Ministry of Defence, the North Atlantic Treaty Organization (NATO) and the International Hydrographic Organization (IHO), for navigation, attitude and heading referencing systems using the geomagnetic field. It is also used widely in civilian navigation and heading systems. The model, associated software, and documentation are distributed by NGDC on behalf of NGA. The model is produced at 5-year intervals, with the current model expiring on December 31, 2014.

status: (MD_ProgressCode) completed

pointOfContact: xlink: <https://www.ngdc.noaa.gov/docucomp/component/75ff8b8b-8a08-49b9-a469-e3f35bdf6164> title: Stefan Maus

resourceMaintenance: (MD_MaintenanceInformation)

maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded

graphicOverview: (MD_BrowseGraphic)

fileName: http://ngdc.noaa.gov/geomag/WMM/data/WMM2010/WMM2010_D_MERC.pdf

fileDescription: Declination contour map in mercator projection

fileType: PDF

descriptiveKeywords: (MD_Keywords)

keyword: EARTH SCIENCE > Solid Earth > Geomagnetism > Magnetic Field

keyword: EARTH SCIENCE > Solid Earth > Geomagnetism > Magnetic Intensity

keyword: EARTH SCIENCE > Solid Earth > Geomagnetism > Magnetic Declination

keyword: EARTH SCIENCE > Solid Earth > Geomagnetism > Magnetic Inclination

type: (MD_KeywordTypeCode) theme

thesaurusName: xlink: <https://ngdc.noaa.gov/docucomp/227737d0-428b-11df-9879-0800200c9a66> title: GCMD Science Keywords

descriptiveKeywords: (MD_Keywords)

keyword: DOC/NOAA/NESDIS/NGDC > National Geophysical Data Center, NESDIS, NOAA, U.S. Department of Commerce

type: (MD_KeywordTypeCode) dataCenter

thesaurusName: xlink: <https://ngdc.noaa.gov/docucomp/9f0de6e6-428b-11df-9879-0800200c9a66> title: GCMD Data Center Keywords

descriptiveKeywords: (MD_Keywords)

keyword: Geographic Region > Global

type: (MD_KeywordTypeCode) place

thesaurusName: xlink:

<https://ngdc.noaa.gov/docucomp/82A5DD19565ACBECE040AC8C5AB41A40> title: GCMD Location Keywords

resourceConstraints: xlink: <https://ngdc.noaa.gov/docucomp/dadd4ac3-2b9f-4db5-8603-71285b94c3d7> title: NOAA Disclaimer

resourceConstraints: xlink: <https://ngdc.noaa.gov/docucomp/295cb881-4997-4a93-b31a-10855ef59b83> title: NGDC Copyright

spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid

language: eng; USA

topicCategory: (MD_TopicCategoryCode) geoscientificInformation

extent: (EX_Extent) boundingExtent

geographicElement: (EX_GeographicBoundingBox) boundingGeographicBoundingBox

westBoundLongitude: -180

eastBoundLongitude: 180

southBoundLatitude: -90

northBoundLatitude: 90

temporalElement: (EX_TemporalExtent) boundingTemporalExtent

extent:

TimePeriod: datasetTimePeriod

beginPosition: 2000-01-01

endPosition: 2014-12-31

[return to top](#)

contentInfo: (MI_CoverageDescription)

attributeDescription:

RecordType: Grid Cell

contentType: (MD_CoverageContentTypeCode) physicalMeasurement

dimension: (MD_Band)

descriptor: Northerly Intensity

maxValue:

Real: 42000

minValue:

Real: -17000

units:

BaseUnit: *North*

identifier: nanoTesla

unitsSystem: *missing*

dimension: (MD_Band)

descriptor: Easterly Intensity

maxValue:

Real: 17000

minValue:

Real: -18000

units:

BaseUnit: *East*

identifier: nanoTesla

unitsSystem: *missing*

dimension: (MD_Band)

descriptor: Vertical Intensity

maxValue:

Real: 61000

minValue:

Real: -67000

units:

BaseUnit: *Vertical*

identifier: nanoTesla

unitsSystem: *missing*

dimension: (MD_Band)

descriptor: Horizontal Intensity

maxValue:

Real: 42000

minValue:

Real: 00

units:

BaseUnit: *Horizontal*

identifier: nanoTesla

unitsSystem: *missing*

dimension: (MD_Band)

descriptor: Total Intensity

maxValue:

Real: 67000

minValue:

Real: 22000

units:

BaseUnit: *Total*

identifier: nanoTesla

unitsSystem: *missing*

dimension: (MD_Band)

descriptor: Inclination

maxValue:

Real: 90

minValue:
Real: -90
units:
BaseUnit: *Inclination*
identifier: degree
unitsSystem: *missing*
dimension: (MD_Band)
descriptor: Declination
maxValue:
Real: 90
minValue:
Real: -90
units:
BaseUnit: *Declination*
identifier: degree
unitsSystem: *missing*
dimension: (MD_Band)
descriptor: Grid Variation
maxValue:
Real: 180
minValue:
Real: -180
units:
BaseUnit: *Grivation*
identifier: degree
unitsSystem: *missing*

[return to top](#)

distributionInfo: (MD_Distribution)
distributionFormat: (MD_Format)
name: WMM2010_Windows.zip
version: 1
specification: World Magnetic Model (WMM2010) with the new C software and executables for Windows environment.
distributionFormat: (MD_Format)
name: WMM2010_Linux.tar.zip
version: 1
specification: World Magnetic Model (WMM2010) with new C software and executables for Linux environment.
distributionFormat: (MD_Format)
name: WMM2010LegacyFortran.zip
version: 1
specification: World Magnetic Model (WMM2010) with Fortran source code and executables for Windows and Linux environments.
distributionFormat: (MD_Format)
name: WMM2010LegacyC.zip
version: 1
specification: World Magnetic Model (WMM2010) with C source code and executables for Windows and Linux environments.
distributionFormat: (MD_Format)
name: WMM2010GUI.zip
version: 1
specification: World Magnetic Model (WMM2010) with Stand-alone Graphical User Interface (GUI) for Windows and C source code.
distributor: (MD_Distributor)
distributorContact: xlink: <https://www.ngdc.noaa.gov/docucomp/component/75ff8b8b-8a08-49b9-a469-e3f35bdf6164> title: Stefan Maus

distributionOrderProcess: (MD_StandardOrderProcess)
fees: None
transferOptions: (MD_DigitalTransferOptions)
transferSize:
Real: 12.4
onLine: (CI_OnlineResource)
linkage: <http://ngdc.noaa.gov/wmmsurvey/magneticSurvey.do?plang=w>
name: WMM2010_Windows.zip
description: World Magnetic Model (WMM2010) with the new C software and executables for Windows environment.
function: (CI_OnLineFunctionCode) download
transferOptions: (MD_DigitalTransferOptions)
transferSize:
Real: 3.3
onLine: (CI_OnlineResource)
linkage: <http://ngdc.noaa.gov/wmmsurvey/magneticSurvey.do?plang=l>
name: WMM2010_Linux.tar.zip
description: World Magnetic Model (WMM2010) with new C software and executables for Linux environment.
function: (CI_OnLineFunctionCode) download
transferOptions: (MD_DigitalTransferOptions)
transferSize:
Real: 1
onLine: (CI_OnlineResource)
linkage: <http://ngdc.noaa.gov/wmmsurvey/magneticSurvey.do?plang=f>
name: WMM2010LegacyFortran.zip
description: World Magnetic Model (WMM2010) with Fortran source code and executables for Windows and Linux environments.
function: (CI_OnLineFunctionCode) download
transferOptions: (MD_DigitalTransferOptions)
transferSize:
Real: .18
onLine: (CI_OnlineResource)
linkage: <http://ngdc.noaa.gov/wmmsurvey/magneticSurvey.do?plang=c>
name: WMM2010LegacyC.zip
description: World Magnetic Model (WMM2010) with C source code and executables for Windows and Linux environments.
function: (CI_OnLineFunctionCode) download
transferOptions: (MD_DigitalTransferOptions)
transferSize:
Real: 8.2
onLine: (CI_OnlineResource)
linkage: <http://ngdc.noaa.gov/wmmsurvey/magneticSurvey.do?plang=g>
name: WMM2010GUI.zip
description: World Magnetic Model (WMM2010) with Stand-alone Graphical User Interface (GUI) for Windows and C source code.
function: (CI_OnLineFunctionCode) download
[return to top](#)

dataQualityInfo: (DQ_DataQuality)
scope: (DQ_Scope)
level: (MD_ScopeCode) dataset
lineage: (LI_Lineage)
processStep: (LE_ProcessStep)
description: Measurements during daytime and during periods of strong solar activity are contaminated by external current systems, which are difficult to accurately model. Therefore, only nighttime data during magnetically quiet periods were used in estimating the WMM coefficients.

processor: xlink: <https://www.ngdc.noaa.gov/docucomp/component/75ff8b8b-8a08-49b9-a469-e3f35bdf6164> title: Stefan Maus

processingInformation: (LE_Processing)

identifier: (MD_Identifier)

code: Processing steps were carried out collectively by the developers of the model. These developers are listed as authors of the associated paper "The US/UK Magnetic Model 2010-2015" which can be found at http://ngdc.noaa.gov/geomag/WMM/data/WMM2010/WMM2010_Report.pdf

algorithm: (LE_Algorithm)

citation: xlink: <https://www.ngdc.noaa.gov/docucomp/component/ea1b8745-ca9f-432f-83c0-e143a156e9c6> title: WMM2010 Report

description: Refer to technical report, "The US/UK Magnetic Model 2010-2015", for description of gridding algorithms.

processStep: (LE_ProcessStep)

description: Some contributions to the measured magnetic field, such as the diamagnetic effect of ionospheric plasma (Lühr et al, 2003) or motional induction by tidal ocean currents (Kuvshinov and Olsen, 2005; Maus, 2007), can be accurately modeled and were corrected for prior to the estimation of the WMM main field coefficients.

processor: xlink: <https://www.ngdc.noaa.gov/docucomp/component/75ff8b8b-8a08-49b9-a469-e3f35bdf6164> title: Stefan Maus

processingInformation: (LE_Processing)

identifier: (MD_Identifier)

code: Processing steps were carried out collectively by the developers of the model. These developers are listed as authors of the associated paper "The US/UK Magnetic Model 2010-2015" which can be found at http://ngdc.noaa.gov/geomag/WMM/data/WMM2010/WMM2010_Report.pdf

algorithm: (LE_Algorithm)

citation: xlink: <https://www.ngdc.noaa.gov/docucomp/component/ea1b8745-ca9f-432f-83c0-e143a156e9c6> title: WMM2010 Report

description: Refer to technical report, "The US/UK Magnetic Model 2010-2015", for description of gridding algorithms.

processStep: (LE_ProcessStep)

description: To account for the contributions that have not been removed in the previous steps, an extended set of model parameters is co-estimated with the WMM model coefficients. These account for smaller-wavelength internal magnetic field contributions (spherical harmonic degree larger than 12), second time derivatives (secular acceleration) and contributions from currents external to the Earth. The set of WMM coefficients plus the extended model parameters is called a parent model of the WMM. Two different parent models were produced, reflecting different modeling strategies employed by NGDC for the main field model and BGS for the secular variation model.

processor: xlink: <https://www.ngdc.noaa.gov/docucomp/component/75ff8b8b-8a08-49b9-a469-e3f35bdf6164> title: Stefan Maus

processingInformation: (LE_Processing)

identifier: (MD_Identifier)

code: Processing steps were carried out collectively by the developers of the model. These developers are listed as authors of the associated paper "The US/UK Magnetic Model 2010-2015" which can be found at http://ngdc.noaa.gov/geomag/WMM/data/WMM2010/WMM2010_Report.pdf

algorithm: (LE_Algorithm)

citation: xlink: <https://www.ngdc.noaa.gov/docucomp/component/ea1b8745-ca9f-432f-83c0-e143a156e9c6> title: WMM2010 Report

description: Refer to technical report, "The US/UK Magnetic Model 2010-2015", for description of gridding algorithms.

source: (LI_Source)

description: Challenging Minisatellite Payload (CHAMP) is a German satellite mission dedicated to improving gravity and magnetic field models of the Earth.

sourceCitation: (CI_Citation)

title: CHAMP Satellite Data

date: (CI_Date)

date: 2009-12-31

dateType: (CI_DateTypeCode) publication

citedResponsibleParty: (CI_ResponsibleParty)
organisationName: GFZ German Research Centre for Geosciences
contactInfo: (CI_Contact)
onlineResource: (CI_OnlineResource)
linkage: <http://op.gfz-potsdam.de/champ/>
name: The CHAMP Mission

description: Webpage provided details on equipment, mission, as well as results and publications associated with the CHAMP mission.

function: (CI_OnLineFunctionCode) information
role: (CI_RoleCode) originator
sourceExtent: (EX_Extent)
geographicElement: (EX_GeographicBoundingBox)
westBoundLongitude: -180
eastBoundLongitude: 180
southBoundLatitude: -90
northBoundLatitude: 90
temporalElement: (EX_TemporalExtent)
extent:
TimePeriod: *CHAMPtimeperiod*
beginPosition: 2000-07-15
endPosition: 2010-09-19

source: (LI_Source)

description: The Danish satellite Orsted is a dedicated satellite for geomagnetic field modeling.

sourceCitation: (CI_Citation)
title: ORSTED Satellite Data
date: (CI_Date)
date: 2009-12-31
dateType: (CI_DateTypeCode) publication
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: Danish Meteorological Institute
contactInfo: (CI_Contact)

onlineResource: (CI_OnlineResource)
linkage: <http://web.dmi.dk/projects/oersted/>
name: The Orsted Satellite Project
description: Webpage provided details on equipment, mission, as well as results and publications associated with the Orsted satellite mission.

function: (CI_OnLineFunctionCode) information
role: (CI_RoleCode) originator
sourceExtent: (EX_Extent)
geographicElement: (EX_GeographicBoundingBox)
westBoundLongitude: -180
eastBoundLongitude: 180
southBoundLatitude: -90
northBoundLatitude: 90
temporalElement: (EX_TemporalExtent)
extent:
TimePeriod: *ORSTEDtimeperiod*
beginPosition: 1999-02-23
endPosition: 2009-11-30

source: (LI_Source)

description: Magnetism information that is collected at permanent surface magnetic observatories spread across the globe.

sourceCitation: (CI_Citation)
title: INTERMAGNET Observatory Data
date: (CI_Date)
date: 2009-12-31

dateType: (CI_DateTypeCode) publication
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: Internation Real-time Magnetic Observatory Network
contactInfo: (CI_Contact)
onlineResource: (CI_OnlineResource)
linkage: <http://www.intermagnet.org>
name: INTERMAGNET Program
description: Website provides information on participating institutions, observatory locations, and publications associated with the network of observatories.
function: (CI_OnLineFunctionCode) information
role: (CI_RoleCode) originator
sourceExtent: (EX_Extent)
geographicElement: (EX_GeographicBoundingBox)
westBoundLongitude: -177.383
eastBoundLongitude: 172.35
southBoundLatitude: -77.85
northBoundLatitude: 82.5

[return to top](#)

metadataMaintenance: (MD_MaintenanceInformation)
maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) annually
maintenanceNote: Last Review Date: 2012-09-06